



Welcome

to the

***New England
High Performance
Computing
Modernization Program
(HPCMP)***

Air Force Materiel

Command

Electronic Systems Center

High Performance

Computer

Center of Excellence

Overview

March 14, 2001



U.S. AIR FORCE

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***I n t e g r i t y - S e r v i c e - E x c e l l e n
c e***



What is the DoD HPC Modernization Program



- **Provides advanced hardware, computing tools and training to DoD researchers utilizing the latest technology to aid their mission in support of the warfighter.**
- **Aids in decreasing the total life-cycle costs of fielding new warfighting support systems.**
- **Allows the United States to maintain its technological supremacy in weapons systems design into the foreseeable future**



Why We Are Here



- **Inform potential stakeholders on Beneficial Uses of HPC**
- **Obtain Stakeholder Inputs on Their HPC Needs and Potential Use of HPC Resources at ESC**
 - **Academia**
 - **Industry**
 - **Government**
- **Establish a New England Region HPC Stakeholders Team**



Agenda



- **1200 - 1230** **Intro and HPC Center of Excellence Overview**
- **1230 - 1330** **HPC Program and Proposal Overview**
- **1330 - 1500** **Breakout Sessions**
 - **Academia**
 - **Industry**
 - **Government**
- **1500 - 1545** **Breakout Session De-Briefs**
- **1545 - 1600** **Summary**

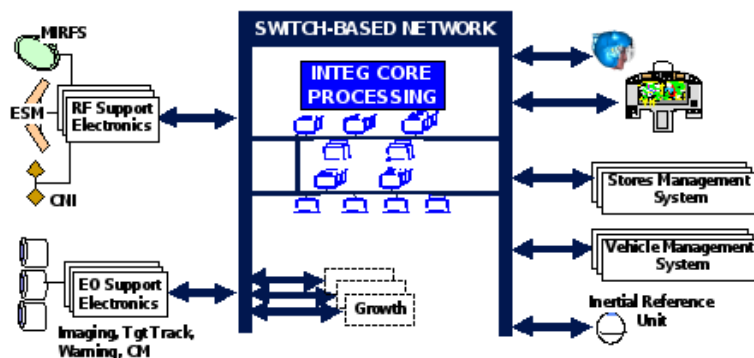


Addressing C2ISR Challenges

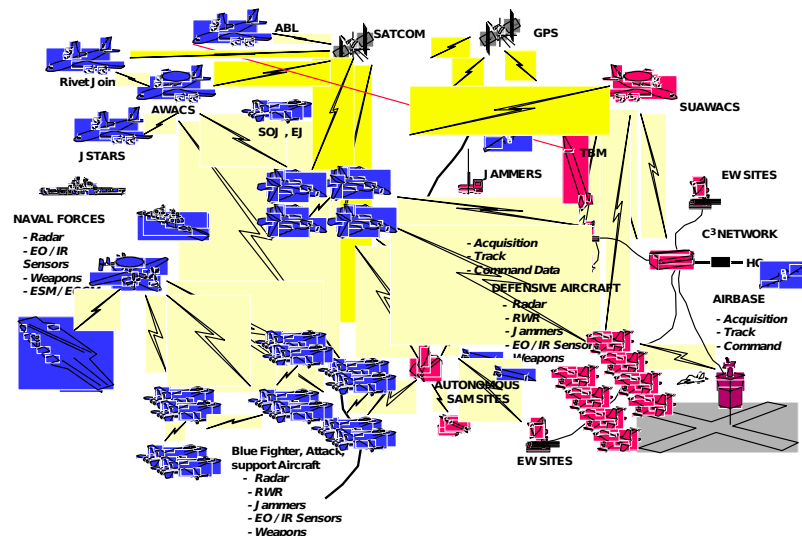
Increasing Weapons System Complexity

AFMC

Complex Integrated Avionics



Several Million Lines of Code

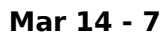


Multi-Spectral Information Battlespace

**Greater Weapon System & Battlespace Complexity
Requires A
Re-Engineered Acquisition and Sustainment System to
Deliver Integrated Family of Systems Solutions to the
Warfighter**



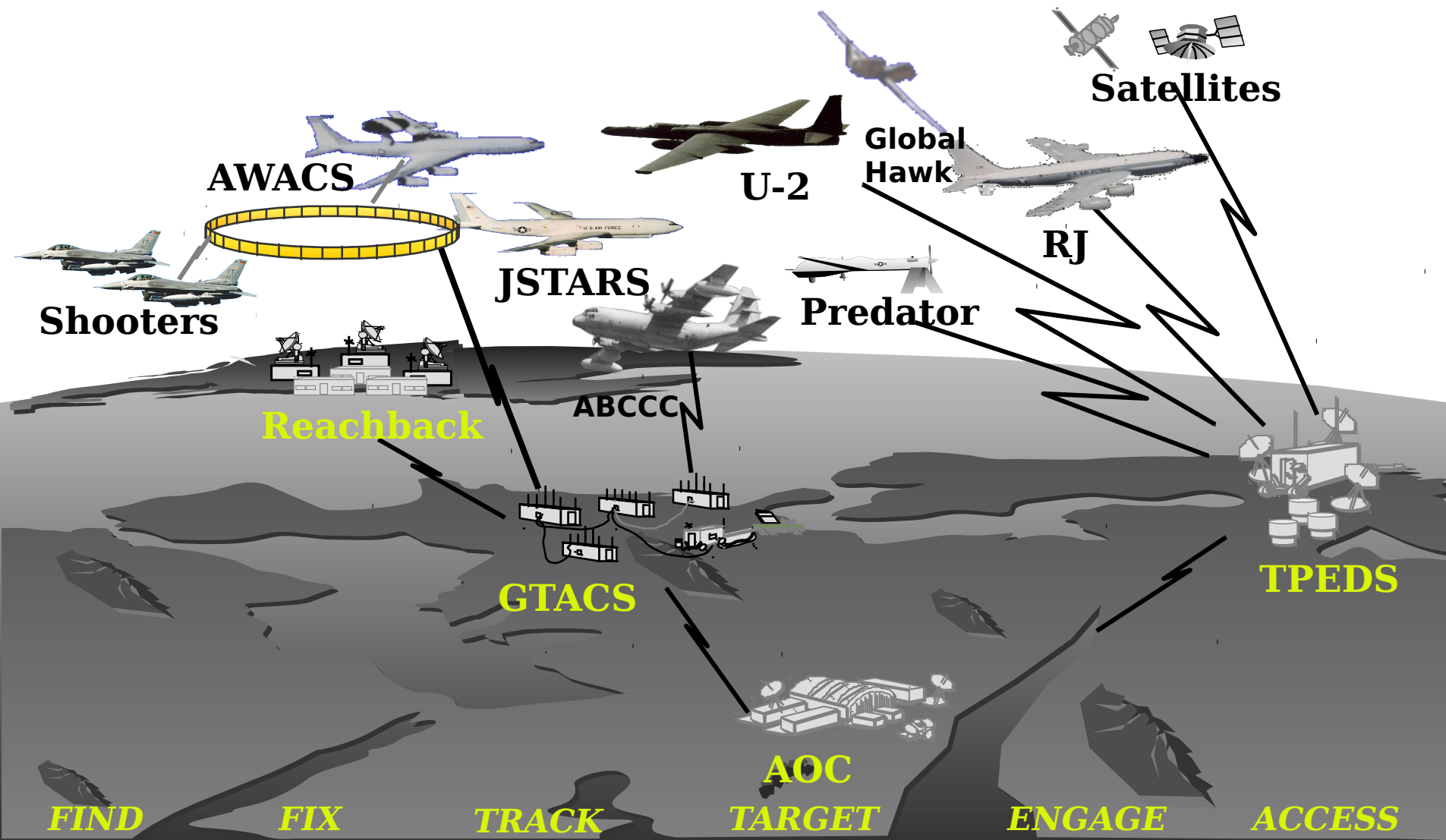
Technology





Synthetic Battlespace

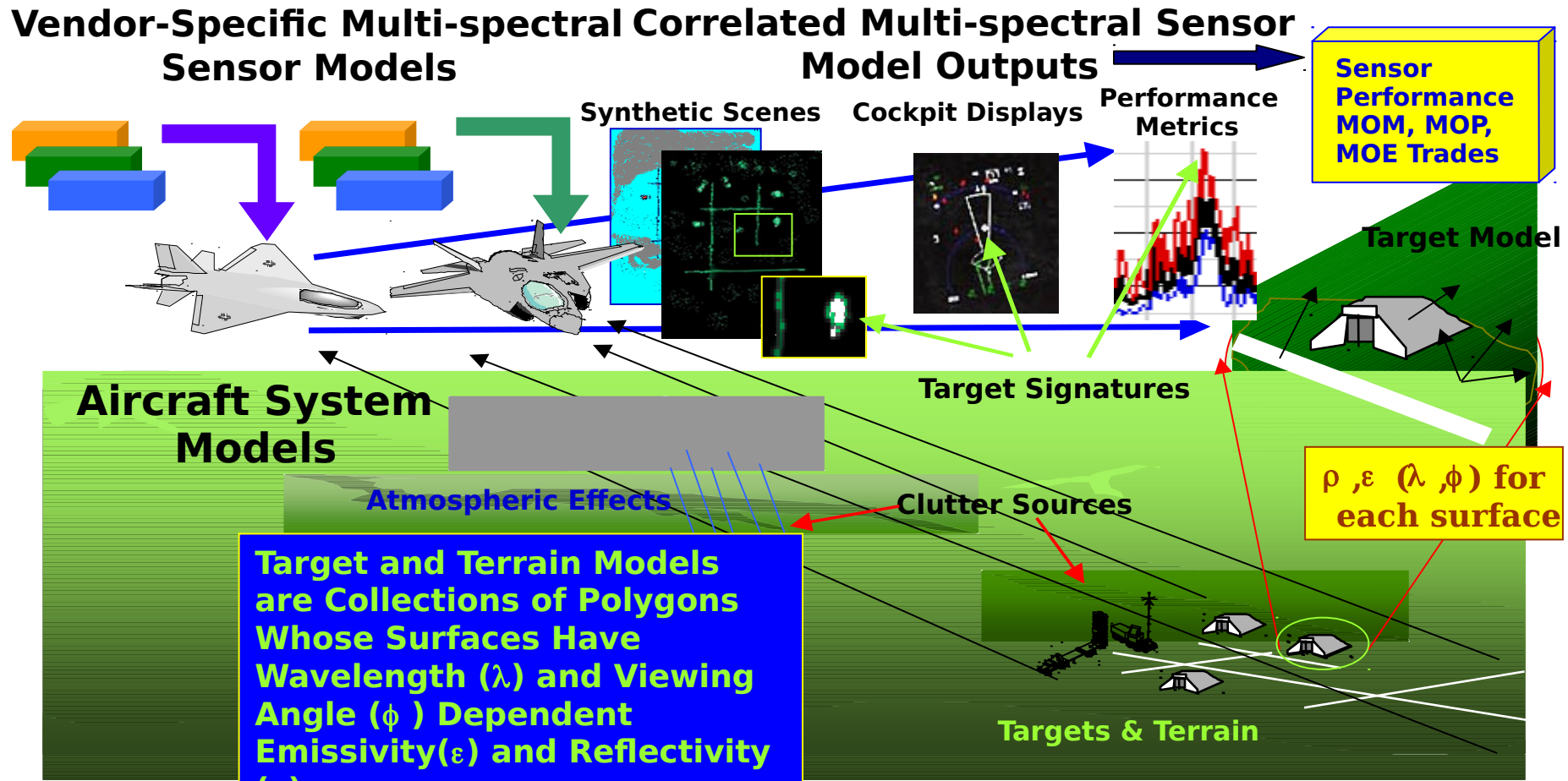
AFMC





Need Robust, Physics-Based Synthetic Environments

AFMC



Synthetic Environment At-sensor Radiance/Reflectance a Function of Wavelength, Terrain/Atmosphere Geophysics, Target Physics, Season, ...



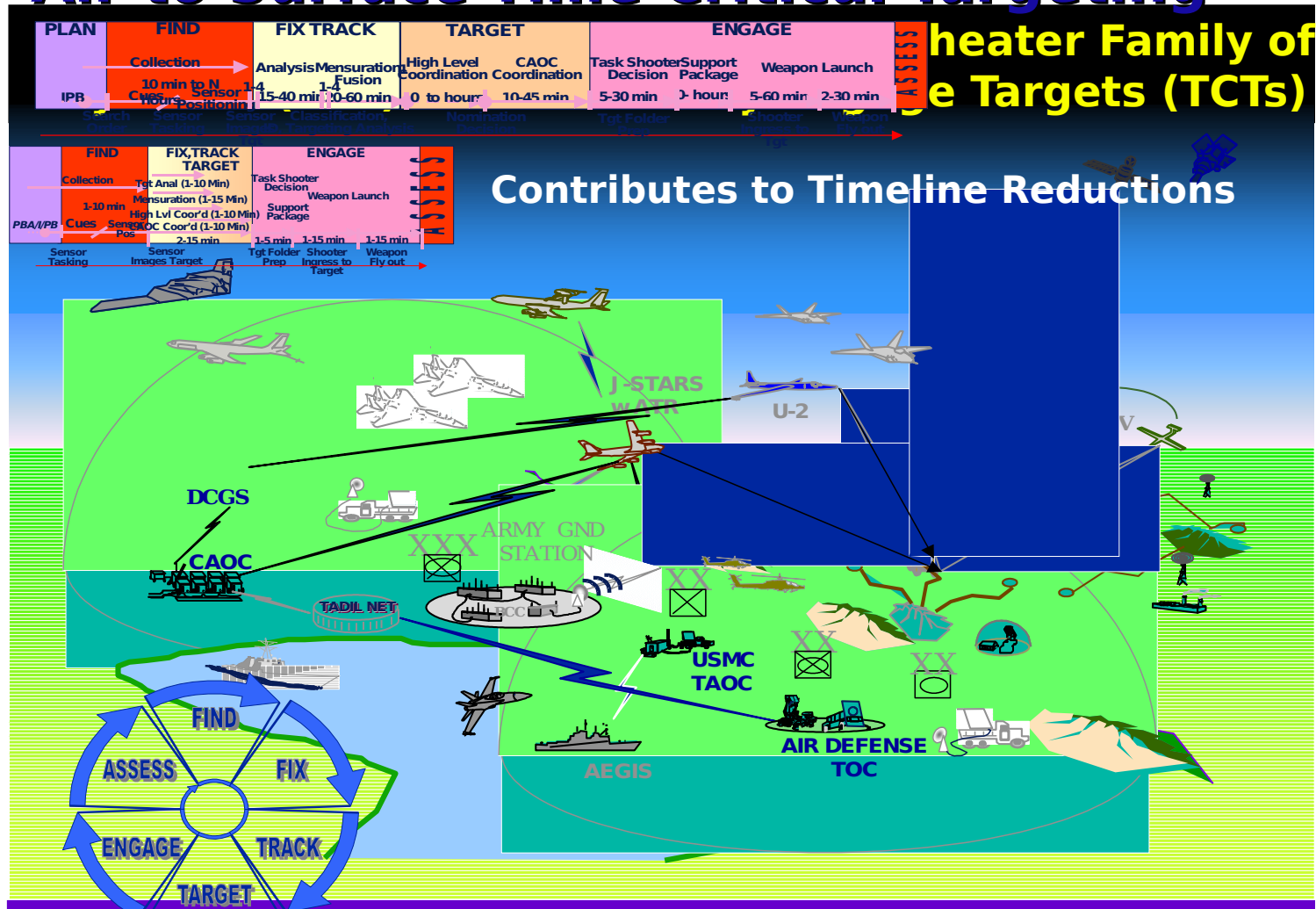
Fall '01 JSB Experiment Focus

Air to Surface Time Critical Targeting AFMC

Working with:

- JC2ISR JT&E
- Target Under Trees (TUT) ATD
- Global Hawk Upgrades
- Sensor Craft
- Platform Independent GMTI Test Bed Working Group
- Space Based Radar GMTI AoA
- Common Wide Body Study
- AC2ISRC-TACCSF
- AFSPACECOM
- AAC, ASC, ESC, SMC, AFFTC, AFRL Wide

- XOC-AFAMS
- Mar 14 - 10
- Other Service

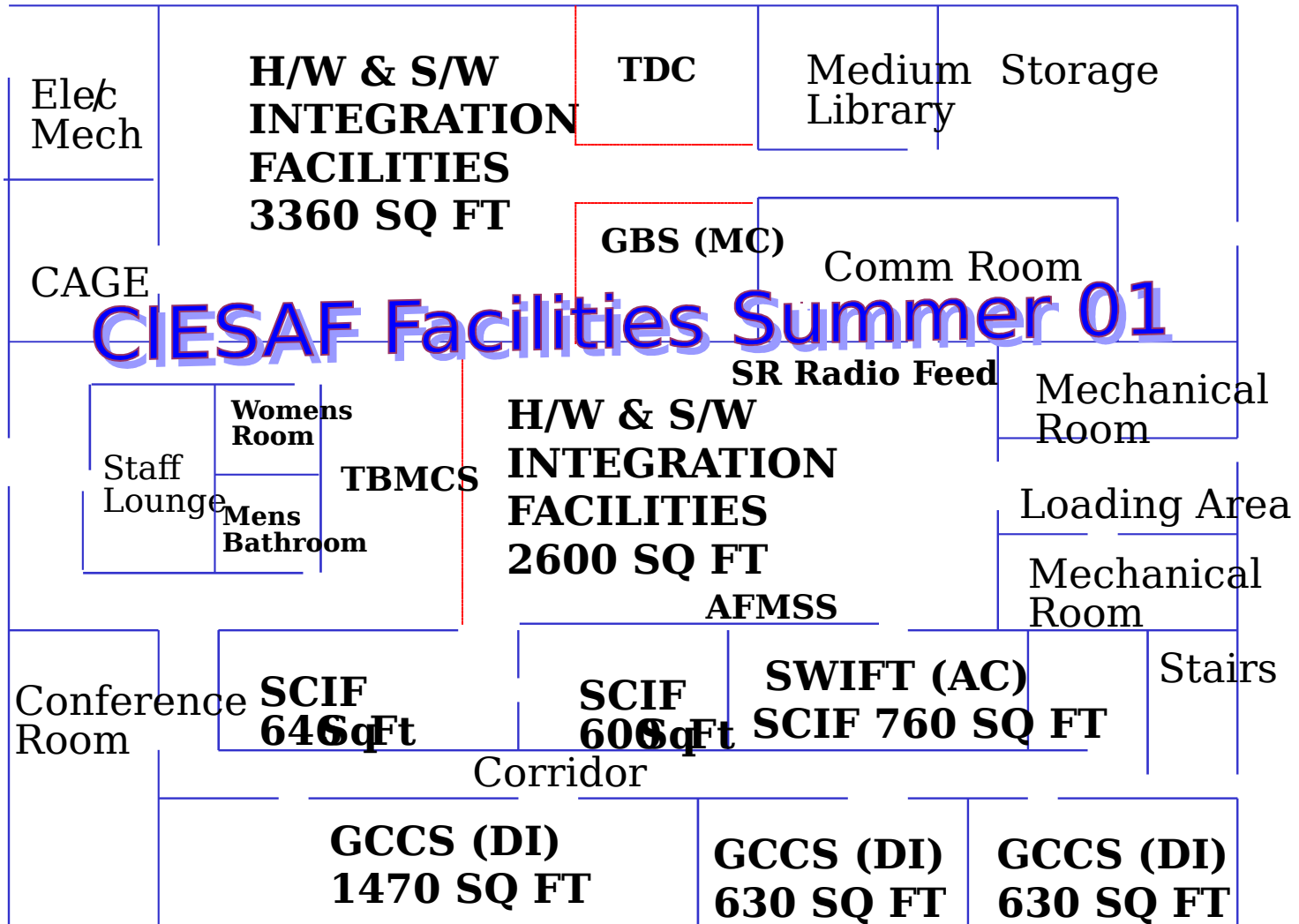


Use Common Metrics, Scenarios and Environment
to Analyze Family of Systems



CIESAF--DOWNSTAIRS 1607

AFMC



Over 15,000 SQ FT of Facilities Supporting C2 Enterprise Integration



CIESAF--UPSTAIRS 1607

AFMC



Nearly 5,000 SQ FT of Facilities Upstairs Not Including Office



CIESAF Attributes



- **Very flexible/highly configurable**
 - Can replicate wide range of operational (e.g., AOC-like) environments; Core capabilities easily built upon
 - ATM/Gigabit backbone; Can also replicate satellite links and operationally loaded Link-16 systems; Can handle multiple network configurations simultaneously
- **Considerable amount of H/W available**
 - Over 200 W/Ss (PC's and UNIX based)
 - Multiple guards (C2, ISSE, firewalls, VPN equipment)
- **Highly skilled network/comms engineers; System-of-Systems hands-on engineers; Analysts; training opportunities readily accessible**
- **C2ISR M&S Center of Excellence**
- **Modeling and Simulation Capabilities**
 - Models and Expertise - EADSIM, JIMM, THUNDER, ADSIM, AFM&STT, MSIM ...



Current ESC HPC Capability



- **Relocating to Building 1607 Late Summer 01**
- **Two classified, controlled access, fully conditioned computer rooms**
 - **1st floor - Systems Engineering and Test Facility (2600ft²)**
 - **2nd floor -- Modeling, Simulation and Analysis Facility (2925 ft²)**
 - **4 Silicon Graphics origin 2000 series computers with 28 processors**
 - **35 Silicon Graphics, SUN, and NT workstations**
- **Communications**
 - **3 Mbyte PVC**
 - **4 Mbyte DREN (April 01)**
 - **10/100 Ethernet network.**
 - **T-1 into SIPRNet and a into the DISN-LES cloud.14**



What is Dren

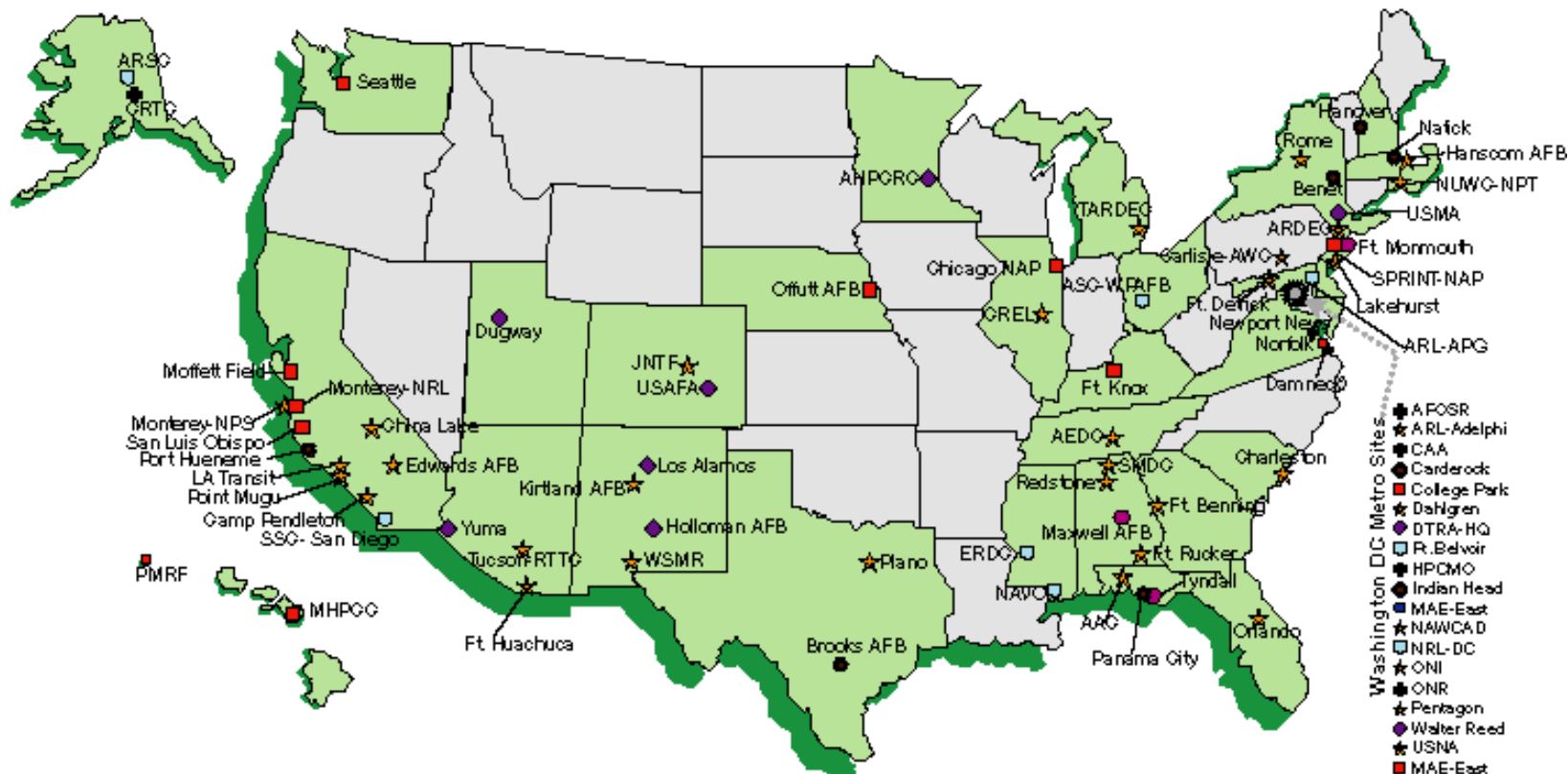


- **The Defense Research Engineering Network (DREN) is a sophisticated and robust DoD communications network.**
- **DREN is a virtual private network over a commercial grid, leveraging public sector investments in the telecommunications infrastructure. DREN provides interoperable asynchronous transfer mode (ATM) and Internet protocol (IP) services for video, audio, imaging, and digital data and connects to other research and academic networks. The network links user sites to four major shared resource centers (MSRCs) and 14 distributed centers (DCs).**
- **DREN enables over 4,000 scientists and engineers at defense laboratories, test centers, universities, and industry sites throughout the United States to use HPCMP computing resources.**



DREN Network

AFMC



- | | |
|---------------------|------------------------|
| ■ ATM OC3 | ★ ATM DS3 |
| ● IP FDDI OC3 | ◆ IP FDDI DS3 |
| ▲ IP FDDI Muxed T1s | ◆ IP Fast Ethernet DS3 |
| ☼ IP Ethernet DS3 | ✚ Tail |
| □ ATM OC12 | |
- ATM - Asynchronous Transfer Mode
FDDI - Fiber Distributed Data Interface
IP - Internet Protocol



CIESAF Summary



- Experts present in all areas from architecture design, and systems integration to modeling and analysis and communication system design
- We have the facilities to enable end-to-end system engineering and testing of C2ISR systems and Family of Systems
- We have the synthetic environment to stimulate the hardware
- We have a HPC capability today that needs to be expanded to meet our the CIESAF vision

Teaming with our New England Neighbors on the Distributed HPCC will enable ESC to Achieve its goals!

How can access to a Distributed HPCC help our New England Neighbors Achieve Their Goals?